神戸市で発見されたヒナノボンボリ(ヒナノシャクジョウ科)

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Shuichi NOSHIRO* and Mitsuo SUZUKI**: Horizontal and Altitudinal Distribution of *Tetracentron sinense* in East Nepal

能城修一*・鈴木三男**：東ネパールにおける
Tetracentron sinense の分布

Abstract

Horizontal and altitudinal distribution of *Tetracentron sinense* in East Nepal is studied. This species is widely distributed between 87°10'E and 88°00'E in longitude, and between 27°20' N and 27° 50'N and at 27°07'N in latitude. Its distribution extends northward along the Arun Valley, but is restricted within the middle stream in the Tamur Valley. It grows between 2100 and 2900 m in altitude among *Quercus, Acer* and *Tsuga* forests. Its range extends nearly horizontally in east-west direction, but seems to lower in northern areas. The present study confirmed that habitats are restricted to small undisturbed forests in the study area, and the conservation and protection of these forests are necessary.

Key words: altitudinal distribution, East Nepal, horizontal distribution, *Tetracentron sinense.*

Since the discovery at two localities in 1963 during the Second Botanical Expedition of the University of Tokyo (HARA and KANAI, 1964), specimens of *Tetracentron sinense* OLIVER (Tetracentraceae) have been collected extensively in East Nepal. This species, distributed from East Nepal to Central China, has been attracting attention of botanists as a monotypic vesselless dicotyledon since HARMS (1897) described the vesselless state. Though it was once included in Homoxylae (Van TIEGHEM, 1900) together with all the other vesselless taxa, it is now regarded as forming Trochodendrales in Hamamelidae with another East Asian vesselless genus *Trochodendron* (CRONQUIST, 1981 ; Takhtajan, 1980). Recently SUZUKI *et al.* (1991a) discovered a unique structure, i.e., radial rows of unusual tracheids, in its stemwood and branchwood from materials obtained in East Nepal, which has not been found in all of the living or fossil woods. Based on this character, SUZUKI *et al.* (1991b) revised homoxylic fossil woods, and confirmed the existence of a *Tetracentron* species in central Japan during the Miocene period. Though *Tetracentron sinense* is still an interesting material to botanists, it has not been studied comprehensively due to difficulty in obtaining living material, and even its distributional range has not been clarified. In 1988 and 1992, we conducted botanical researches in East Nepal, and could observe living *Tetracentron* at several habitats except the upper stream of the Arun River. Its habitats in East Nepal are confined to well-preserved natural forests consisting of *Quercus, Acer, Magnolia, Prunus* or *Rhododendron,* and these forests often border on fodder forests, and face destruction by villagers. Here we will describe horizontal and altitudinal distribution of this species in East Nepal at present, and would like to clarify its spatial position, comparing with those of other Eastern Himalayan elements.

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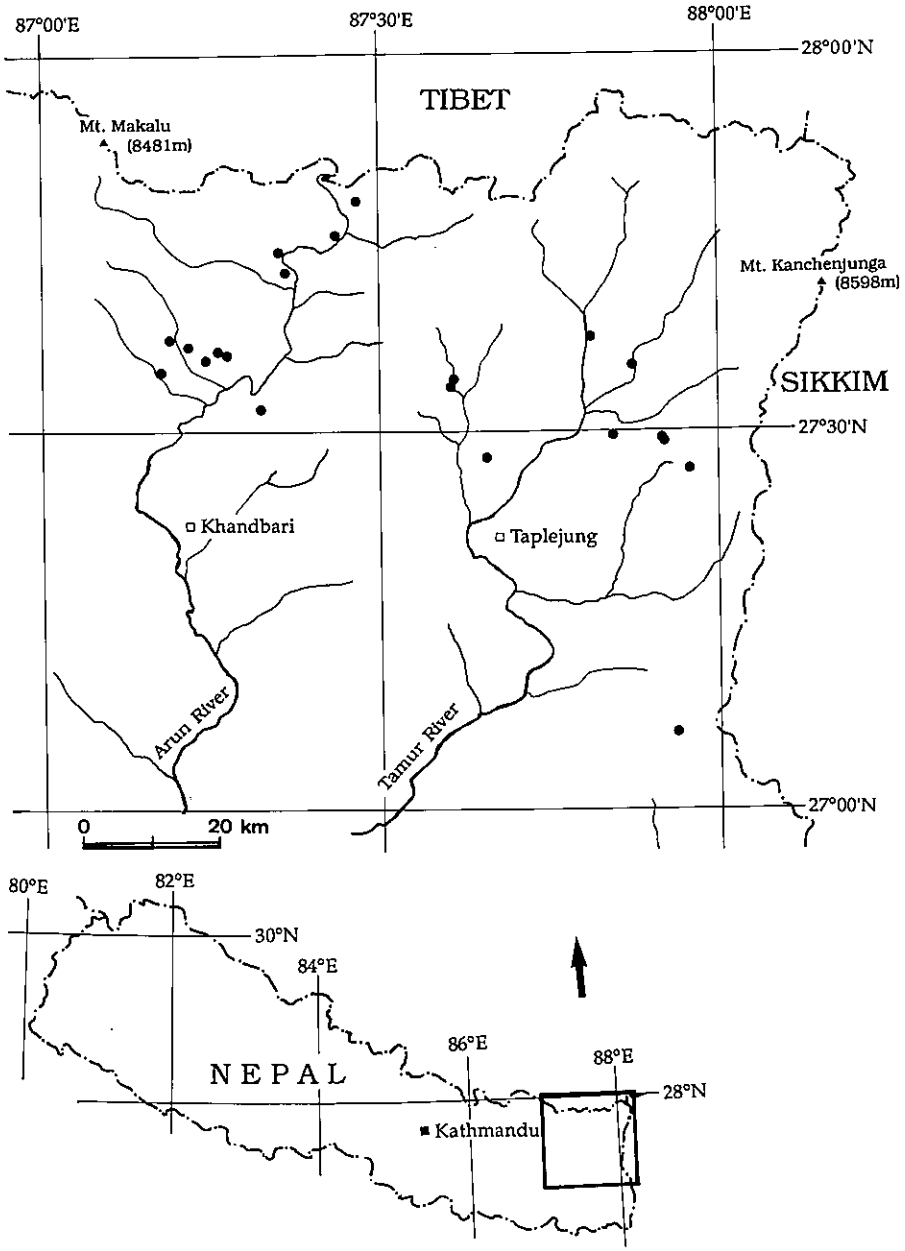

FIG. 1. Horizontal distribution of *Tetracentron sinense* in East Nepal.

Materials and Methods

Field observation and collection were carried out in the Arun valley in 1988 and in the Tamur valley in 1992 at eight localities. The collected herbarium specimens are deposited in TI. All the other herbarium specimens deposited in TI and KTM are studied (Table 1). Some doubtful altitudinal data are corrected comparing our field record and the published itineraries of former collectors.

Results

Total of thirty specimens of *Tetracentron sinense* have been collected in East Nepal (Table 1). In

TABLE 1. *Tetracentron sinense* specimens collected in East Nepal.

Locality	Alt. (m)	Date	Coll. & No.	Herb.
Koshi Zone, Sankuwasabha Distr.				
Dobtak-Saisimha	2300	29-May-1989	P.R. SHAKYA 9334	KTM
Tambure Kharka, Apsuwa valley	2240	30-May-1989	P.R. SHAKYA 9336	KTM
Thokpu-Syakin, Isuwa Khola	2530	16-Oct-1981	P.R. SHAKYA 7059	KTM
Eswa valley	2680	2-Nov-1981	P.R. SHAKYA 7305	KTM
Khiraunle, Iswa Khola	2740	18-Oct-1981	P.R. SHAKYA 7090	KTM
Tashigaon-Ghangma	2470	6-Sep-1986	SHRESTHA & SHAKYA 8958	KTM
Tashi Gaun-Bhainsi Kharka	2200	14-Jul-1988	SUZUKI *et al.* 8840188	TI
Tashi Gaun-Bhainsi Kharka	2420	14-Jul-1988	SUZUKI *et al.* 8840189	TI
Mangsing Danda	2360	3-Oct-1981	P.R. SHAKYA 6845	KTM
Above Shinbun-Hatia Gola		3-Aug-1977	OHASHI *et al.* 771961	TI
Hatia Gola-Digedanda-Taram Bhanjyang-Honkon	2580	5-Aug-1977	OHASHI *et al.* 772019	TI
Lungmuchi-Chhyaumjam	2650	14-Apr-1991	P.R. SHAKYA 9729	KTM
Chyamtang-Chhyangmarimu	2350	18-Apr-1991	P.R. SHAKYA 9466	KTM
Redak-Chhurchatanga		9-Aug-1977	OHASHI *et al.* 770553	TI
Mechi Zone, Taplejung Distr.				
Syamba-Manabhara	2530	20-May-1992	SUZUKI *et al.* 9261049	TI
Shewaden-Papung	2470	22-Aug-1977	OHASHI *et al.* 773951	TI
Sewaden	2490	15-May-1992	SUZUKI *et al.* 9261021	TI
Sewaden	2560	17-May-1992	SUZUKI *et al.* 9261041	TI
Sewaden-Dongen	2190	18-May-1992	SUZUKI *et al.* 9261047	TI
Thakma Khola-Diorali Bhanjang, 3200m	2800*	14-Nov-1963	HARA *et al.* 6300380	TI
Amjilasa-Gyable	2290	5-Jun-1992	NOSHIRO *et al.* 9261167	TI
Ramsyang Pati	2310	24-May-1992	SUZUKI *et al.* 9261060	TI
Ramsyang Pati	2310	2-Jun-1992	SUZUKI *et al.* 9261154	TI
Dorongden-Deurali-Amji Khola	2480	12-Jun-1992	NOSHIRO *et al.* 9261274	TI
Amji Khola	2310	12-Jun-1992	NOSHIRO *et al.* 9261277	TI
Sigre Danda-ridge-Bhitte Kharka	2460	15-Jun-1992	NOSHIRO *et al.* 9261285	TI
Mechi Zone, Illam Distr.				
Bhandukay Bhanjang, 3100m	2700*	3-Dec-1963	HARA *et al.* 6300379	TI
Chhintapu	2900	8-Jun-1969	L.H.J. WILLIAMS 452	TI
Banduke (Chhintapu)	2900	9-Jun-1969	T.B. SHRESTHA 15474	KTM

* Corrected based on our field observation and published itineraries.

the Arun Valley it grows along the Arun River, almost to the Tibet border, from 87°10'E to 87°30' E in longitude and from 27°30' N to 27°50'N in latitude. All the specimens is found within 10 km from the main stream (Fig. 1). In the Tamur Valley it is distributed in the middle area from 87° 30'E to 88°00'E in longitude and from 27°40' N to 27°40'N in latitude. Here it is found in such side valleys as Mewa Khola, Ghunsa Khola, Sibuwa Khola and Kabeli Khola. The different distribution between the Arun and Tamur valleys is caused by the existence or non-existence of the Himalayas on the northern border of each valley. To the south of these localities *T. sinense* is found only on a dividing ridge of the Tamur and Mai watersheds at 27°07'N and 87°55'E, and no specimens have been collected in between.

Its altitudinal distribution is between 2200 and 2800 m both in the Arun and the Tamur Valley, and between 2700 and 2900 m on the southern ridge. Altitudinal range seems to decrease toward the north, but it has not been confirmed due to insufficient collections from the southern part of the study area. In the east-west distribution, the upper limit seems to dip at about 87°40'E, and this is not clear because collections are few and from restricted areas. The lower limit is nearly horizontal in the east-west direction.

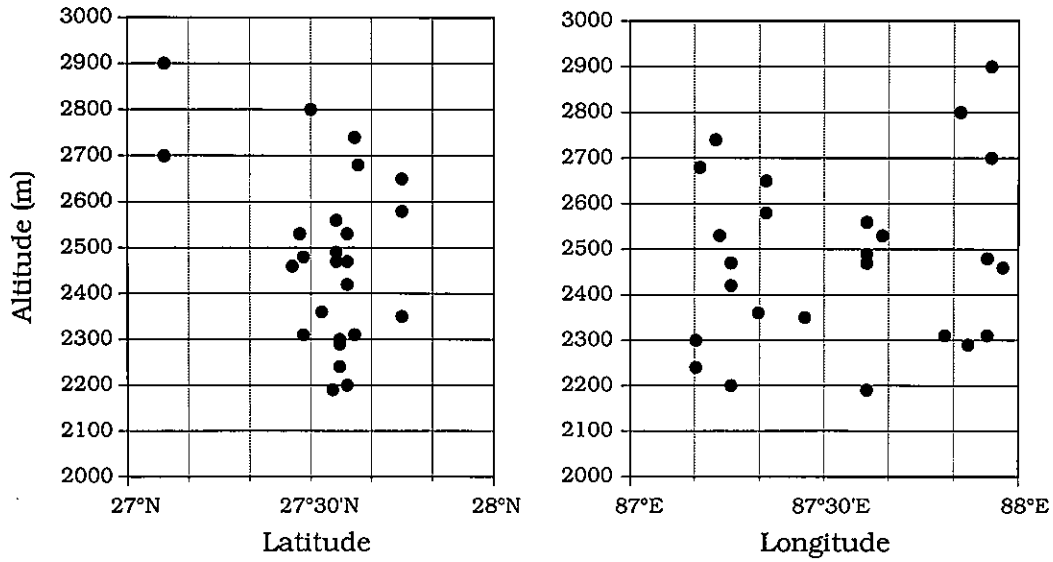

FIG. 2. Altitudinal distribution of *Tetracentron sinense* in East Nepal.

Physiognomy of forests with *Tetracentron sinense* at each locality, stage and size of observed trees are as follow:

1. Between Tashi Gaun and Bhainsi Kharka: 2420m, flowering (H=22m, D=36cm), a forest on a small ridge consisting of *Quercus lamellosa, Q. glauca, Acer sterculiaceum,* and *Prunus napaulensis* with *Alangium alpinum, Helwingia himalaica* and *Stachyurus himalaicus* as undergrowth; 2200m, sterile (H=20m, D=35cm), a sparse secondary forest on a gravelly slope.
2. Sewaden-Dongen; 2490m. flowering (H=20m, D=70cm), sterile (H=15m, D=22cm), *Tsuga dumosa-Rhododendron grande* forest in a valley bottom of the Mewa Khola; 2190m, sterile (H=11m, D=12cm), *Q. lamellosa-Acer-R. grande* forest on a valley slope.
3. Syamba and Manabhara: 2530m, sterile (H=20m, D=40cm) *Q. lamellosa-R. grande* forest on a ridge.
4. Ramsyang Pati: 2310m, flowering (H=10m D=25cm), *Alnus nepalensis-Acer-Quercus lamellosa* forest at the lower limit of *Tsuga dumosa* forest in a small side valley of the Tamur River.
5. Amjilasa-Gyabla: 2290m, sterile (H=6m, D=9cm), riverside secondary forest beside the Ghunsa Khola.
6. Dorongden-Deurali-Amji Khola: 2480m, sterile (H=6m, D=12cm), *Alnus nepalensis* forest on a steep mountain slope.
7. Amji Khola: 2310m, flowering (H=8m, D=18cm), riverside *Q. lamellosa-Acer* forest beside the Amji Khola.
8. Sigre Danda-Bhitte Kharka: 2460m, sterile (H=6m, D=16cm), regeneration forest on a mountain slope.

According to OHSAWA *et al.* (1983), *Tetracentron sinense* composed a deciduous forest with *Magnolia campbellii* and *Acer campbellii* on a steep slope at Thokpu, 2570m, on the same ridge as locality 1.

Discussion and Conclusion

Tetracentron sinense is one of the East Himalayan elements as is shown in the distribution map of HARA and KANAI (1964), and has been confirmed to grow commonly in the temperate region of East Nepal. STAINTON (1972) did not mention this species as an East Himalayan element probably because of few collections accumulated at that time. This species is, however, widely distributed as some East Himalayan elements, i.e., *Acer campbellii, Magnolia campbellii, Quercus lamellosa, Rhododendron grande, Helwingia himalaica, Stachyurus himalaicus* (STAINTON, 1972), and often forms deciduous or mixed forests together with these species. According to the field observation, mature flowering individuals are restricted to natural forests in this area, and those growing in secondary ones are young and sterile.

Its seedlings are rare in such natural forests (OHSAWA *et al.*, 1983), and the regeneration process is obscure. Existence of these natural forests are the results of low population density in this area, but the surrounding areas are nearly deforested or turned into fodder forests. With the present population increase in this area, such natural forests face destruction by villagers and their conservation is necessary.

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摘　要

東ネパールにおける *Tetracentron sinense* の水平分布と垂直分布を明らかにした。本種は，この地域では，北緯27°07'の1地点を除けば，アルン河沿いとタムール河沿いの，東経87°10'から88°00'，北緯27°20'から27°50'の範囲に分布している。標高的には2200 mから2900 mの範囲に分布している。分布の上限は北ほど低いようにも見えるが，南部の地域における記録が少なく，確実なことは不明である。東西方向でみると，東経87°40'付近で分布上限が下がっているように見えるが，この地域では採集地点が限られており，採集地点の補充が必要である。本種の成熟個体はコナラ属，カエデ属，あるいはツガ属などからなる天然林に限られており，二次林の個体は若いものに限られる。本種は，東ネパールから中国西部にかけて分布する東ヒマラヤ要素のひとつであって，東ネパールに，これらと共にひろく分布していることが明らかになった。現在，こうした天然林のごく周囲まで，放牧地あるいはフォッダー林が迫っており，早急な保全策が求められている。

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○小林篤樹*・黒崎史平**：神戸市で発見されたヒナノボンボリ（ヒナノシャクジョウ科） Tomiki KOBAYASHI* and Nobuhira KUROSAKI**: On a Species of *Oxygyne* (Burmanniaceae) from Kobe City

1992年6月10日7神戸市内でヒナノシャクジョウ科の小さな植物が1個体のみ発見された。生育地は標高約200 mのコナラやアラカシが生える二次林のやや湿った林床で，落葉の中より見い出されたその標本は一夜現地に放置され，翌日の夜に知人を通して，水に浸漬された状態で小林の手元に届けられた。その後，発見地周辺を詳しく探したが，他に見つからなかった。標本は傷んでいたが，4年前に愛媛県から報告されたヒナノボンボリ *Oxygyne hyodoi* ABE et AKAZAWA によく似ていた。しかしいくつかの形質で違いも認められた。今年も引き続き現地調査を行う予定であるが，とりあえず神戸産のヒナノボンボリとして，外部からみた形質の特徴について報告する。

根茎は黄褐色（先端は半透明白色）で，ミミズ状，長さ1.5 cm，径1-1.5 mm，地上部は高さ1.5 cmで，全体に半透明の毛状突起がまばらにみられる。地上茎は長さ3 mm，鱗片状の葉は長楕円状被針形または卵型